

NON-PUBLIC?: N
ACCESSION #: 9308190098
LICENSEE EVENT REPORT (LER)

FACILITY NAME: North Anna Power Station Unit 2 PAGE: 1 OF 04

DOCKET NUMBER: 05000339

TITLE: AUTOMATIC REACTOR TRIP INITIATED FROM A TURBINE TRIP DUE
TO AN OVER EXCITATION OF THE MAIN GENERATOR
EVENT DATE: 04/16/93 LER #: 93-002-01 REPORT DATE: 08/12/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv) & 50.73(a)(2)(v)

LICENSEE CONTACT FOR THIS LER:

NAME: G. E. Kane TELEPHONE: (703) 894-2101

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: TB COMPONENT: BG MANUFACTURER: W120

X JD CHA W120

X SJ RV C710

X SJ IL G080

REPORTABLE NPRDS: Y

Y

Y

N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 16, 1993, at 0717 hours with Unit 2 in Mode 1, 100 percent power, an automatic reactor trip occurred as a result of a turbine trip. Emergency procedures were entered and immediate actions were performed. Subsequently, the operating crew became concerned with the reactor coolant system (RCS) cooldown when temperature decreased to approximately 540 degrees F. To reduce the Steam Generator feedwater addition rate and stabilize the RCS temperature the ATWS Mitigation System Actuation Circuitry was reset and the Auxiliary Feed Water (AFW) pumps were secured before steam generator levels were restored above the automatic start

setpoint. Defeating the automatic start capability of the AFW pumps is prohibited by Technical Specifications. A 4 hour report was made to the NRC at 1055 hours pursuant to 10CFR50.72 (b)(2)(ii) & (iii)(A). The event is reportable as an Engineered Safety Feature System actuation pursuant to 10CFR50.73 (a)(2)(iv) & (v).

The cause of the turbine trip/reactor trip was a malfunction in the main generator voltage regulator circuitry. The cause of defeating the AFW system during the event was a result of personnel error.

No significant safety consequences resulted from the reactor trip because reactor protection safety systems responded as designed. Disabling the AFW pumps did not present a significant safety consequence because the heat sink was maintained throughout the event. Therefore, the health and safety of the public were not affected at any time during this event.

END OF ABSTRACT

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1.0 Description of the Event

On April 16, 1993, at 0717 hours with Unit 2 in Mode 1, 100 percent power, an automatic reactor trip occurred from a turbine trip due to a malfunction in the main generator voltage regulator circuitry (EIS System TB, Component TG). Emergency procedures were entered and immediate actions were performed. The Auxiliary Feedwater Pumps (AFW) (EIS System BA, Component P) automatically started on Low Low Steam Generator (SG) (EIS System AB, Component SG) level. During subsequent recovery actions of the reactor trip response procedure it was noted that the reactor coolant system (RCS) was experiencing a cooldown due to feeding the SGs with relatively cold water from the AFW system. The operating crew became concerned with the RCS (EIS System AB) cooldown rate when temperature decreased to approximately 540 degrees F. To reduce the SG feedwater (EIS System SJ) addition rate and stabilize the RCS temperature the ATWS Mitigation System Actuation Circuitry (EIS System JC) was reset, and the AFW pumps were secured in a manner that rendered them inoperable before SG levels were restored above the automatic start setpoint.

After securing the AFW, Main Feed Water (MFW) was the makeup water source for the SGs. Subsequently, approximately 19 minutes later, the emergency procedure reader noticed that the AFW pump status did not conform to the appropriate emergency procedure step and immediately notified the Shift Supervisor (SS) who directed the pumps to be returned to AUTO. Defeating the automatic start capability of the AFW pumps is prohibited by Technical Specifications. A 4 hour report was made to the NRC at 1055

hours pursuant to 10CFR50.72 (b)(2)(ii) & (iii)(A). The event is reportable as an Engineered Safety Feature System actuation pursuant to 10CFR50.73 (a)(2)(iv) & (v).

2.0 Significant Safety Consequences and Implications

No significant safety consequences resulted from the reactor trip because reactor protection safety systems responded as designed. No significant safety consequences resulted from disabling the AFW pumps for approximately 19 minutes because the heat sink was maintained throughout the event. The AFW pumps could have been made available immediately by manual operator action. The AFW system was always under the cognizance of Licensed Operator. Main feedwater was also available throughout the event and used to provide makeup to the SGs. Therefore, the health and safety of the public were not affected at any time during this event.

3.0 Cause of the Event

The cause of the turbine trip/reactor trip was the result of a malfunction in the main generator voltage regulator circuitry. An exciter field forcing condition, which led to the trip, was attributed to a combination of erratic behavior of the Minimum Excitation Limiter (MEL), and/or Voltage Error Detector (VEO) and failure of the damping card due to a corroded gain potentiometer within the logic drawer of the voltage regulator.

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3.0 Cause of the Event (continued)

The cause of defeating the AFW system was personnel error. Insufficient command and control of the unit trip response and inadequate communications between the operations crew members resulted in defeating the AFW pump, when a valid start signal was present.

The policy associated with defeating equipment or system automatic safety functions was misunderstood. In addition, management expectation of communications and problem solving using all crew members was not effectively conveyed.

4.0 Immediate Corrective Actions

An inspection of the turbine/generator was performed to determine the extent of the voltage regulator malfunction. Operating parameters from the voltage regulator were gathered for analysis.

Following the reactor trip Emergency Procedure 2-E-0, Reactor Trip or Safety Injection, was entered and the immediate actions performed. The Shift Supervisor immediately directed that the AFW pumps be returned to the automatic position when the condition was identified.

5.0 Additional Corrective Actions

Troubleshooting of the voltage regulator circuitry determined that the MEL, VEO, and damping cards were not operating properly and were replaced. In addition, an imbalance on the firing circuit drawers was corrected and the overexcitation protection setpoint was recalibrated. The vendor electrical maintenance procedure was enhanced to include preventative maintenance activities.

The individuals involved with the AFW pump condition were coached on the station's policy for defeating equipment automatic functions. These individuals were removed from licensed duties and received remediated training designed to enhance their control room communication skills and their understanding of the control room command and control structure during emergency procedure implementation.

6.0 Actions to Prevent Recurrence

The actions taken regarding the voltage regulator are sufficient to preclude recurrence.

Requirements are in place to ensure the event is discussed in the Licensed Operator Requalification Program. A root cause was performed and corrective actions are being reviewed by management for implementation as appropriate. The training reviews and the actions taken regarding the individuals involved are sufficient to preclude recurrence.

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7.0 Similar Events

LER N2-86-008-00 identified a reactor trip from a turbine trip as a result actuation of a main generator differential lockout relay upon loss of an excitation field signal. The signal was caused by failure of the permanent magnet generator in the main generator excitation system.

8.0 Additional Information

Component failures resulting from the automatic reactor trip included: Source Range Channel N31 failed low, 1A Feedwater Heater relief valve lifted and would not reset until the feedwater heater was isolated and

depressurized, and the "B" MFW Pump breaker indicating lights did not work in the Control Room.

Corrective actions included replacement of the Source Range Channel detector, 1A Feedwater Heater relief valve, and the "B" MFW Pump breaker lights.

Unit 1 was in Mode 3, hot standby, returning to power operations following a refueling outage and was not affected by the event.

ATTACHMENT 1 TO 9308190098 PAGE 1 OF 1

10 CFR 50.73

Virginia Electric and Power Company
North Anna Power Station
P. O. Box 402
Mineral, Virginia 23117

August 12, 1993

U. S. Nuclear Regulatory Commission NAPS:MPW
Document Control Desk Docket No. 50-339
Washington, D.C. 20555 License No. NPF-7

Dear Sirs:

Pursuant to North Anna Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Licensee Event Report Supplement applicable to North Anna Unit 2.

Report No. 50-339/93-002-01

This Supplement Report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Corporate Management Safety Review Committee for its review.

Very Truly Yours,

G. E. Kane
Station Manager

Enclosure:

cc: U.S. Nuclear Regulatory Commission
101 Marietta Street, N.W.

Suite 2900
Atlanta, Georgia 30323

NRC Senior Resident Inspector
North Anna Power Station

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